

AMENDMENTS TO THE CLAIMS:

This listing of claims replaces all prior versions and listings of claims in the application:

LISTING OF CLAIMS:

1. (Previously Presented) A fuel cell assembly comprising:

a fuel cell stack ~~having~~ comprising at least one inlet port for receiving cooling water, the inlet port being connected to a fluid flow plate to deliver the cooling water to a membrane-electrode assembly adjacent to the fluid flow plate, the fluid flow plate further comprising and at least one outlet port for discharging water and/or water vapor ~~from the membrane-electrode assembly, the inlet port and the outlet port each communicating with at least one membrane electrode assembly of the fuel stack; and~~

a thermal storage tank ~~having~~ comprising a heat exchanger conduit therethrough, the heat exchanger conduit ~~having~~ comprising an inlet and an outlet coupled respectively to the at least one outlet port and the at least one inlet port of the fuel cell stack to form a cooling circuit for the fuel cell stack, the cooling circuit for recycling discharged water and/or water vapor directly to the membrane-electrode assembly.

2. (Previously Presented) The fuel cell assembly of claim 1, further comprising a condensate collection unit in the cooling circuit between the heat exchanger outlet and the inlet port of the fuel cell stack.

3. (Previously Presented) The fuel cell assembly of claim 1, further comprising a water pump in the cooling circuit between the heat exchanger outlet and the inlet port of the fuel cell stack.

4. (Previously Presented) The fuel cell assembly of claim 1, wherein the thermal storage tank comprises a water jacket surrounding the heat exchanger conduit.

5. (Previously Presented) The fuel cell assembly of claim 4, wherein the water jacket further comprises a cold water feed and a hot water draw off point.

6. (Previously Presented) The fuel cell assembly of claim 4, further comprising an electrical heating element for heating the water jacket, the electrical heating element being coupled to an electrical output of the fuel cell stack.

7. (Previously Presented) The fuel cell assembly of claim 1, further comprising a pressure regulation means for controllably exhausting waste gases from the cooling circuit.

8. (Previously Presented) The fuel cell assembly of claim 1, wherein the thermal storage tank comprises a secondary water circuit passing therethrough for supplying a space heating radiator system.

9. (Previously Presented) The fuel cell assembly of claim 1, wherein the inlet port of the fuel cell stack receiving water from the cooling circuit is coupled to a direct water injection system of the anodes and/or cathodes in the fuel cell stack.

10. (Previously Presented) The fuel cell assembly of claim 1, wherein the inlet port of the fuel cell stack receiving water from the cooling circuit is coupled to provide preheat of fuel and/or oxidant supply to the respective anodes/cathodes.

11. (Previously Presented) The fuel cell assembly of claim 5, further comprising a valve coupled between the hot water draw off point and a waste water outlet, and a temperature sensor in the cooling circuit for actuating the valve when the water in the cooling circuit exceeds a predetermined temperature.

12. (Previously Presented) The fuel cell assembly of claim 1, wherein the at least one outlet port comprises a cathode exhaust port.

13. (Currently Amended) A method of operating a fuel cell assembly, comprising:
feeding fuel and oxidant into a fuel cell stack to generate electrical current and
water/water vapor by-product;

feeding the water/water vapor into a heat exchanger conduit of a thermal storage tank and
extracting heat energy therefrom;

retrieving water and/or vapor condensate from the heat exchanger conduit and supplying the water and/or vapor condensate ~~it back~~ to a membrane-electrode assembly in the fuel stack;
and

storing the thermal energy in the thermal storage tank,

the fuel cell stack and heat exchanger conduit forming a water cooling circuit, the water cooling circuit for retrieving the water and vapor condensate from the heat exchanger conduit and supplying the water and/or vapor condensate directly to the membrane-electrode assembly in the fuel stack.

14. (Currently Amended) The method of claim 13, further comprising collecting the retrieved water and/or vapor condensate in a condensate collection unit in the cooling circuit between the heat exchanger and an inlet port of the fuel cell stack.

15. (Previously Presented) The method of claim 13, further comprising storing the retrieved energy in a water jacket of a thermal storage tank.

16. (Previously Presented) The method of claim 15, further comprising drawing off heated water from the water jacket and replenishing with cold water.

17. (Previously Presented) The method of claim 13, further comprising heating water in a second water circuit from the thermal storage tank.

18. (Currently Amended) The method of claim 13, further comprising providing the retrieved water and/or vapor condensate as input to a direct water injection system of anodes and/or cathodes in the fuel cell stack.

19. (Currently Amended) The method of claim 13 further comprising providing the retrieved water and/or water vapor condensate to the fuel cell stack for preheat of fuel and/or oxidant supply to the respective anodes/cathodes.

20 and 21. (Canceled)

22. (New) A fuel cell assembly comprising:

a fuel cell stack comprising at least one inlet port for receiving cooling water and at least one outlet port for discharging water and/or water vapor, the inlet port and the outlet port each communicating with at least one membrane electrode assembly of the fuel stack;

a thermal storage tank comprising a heat exchanger conduit therethrough, the heat exchanger conduit having an inlet and an outlet coupled respectively to the at least one outlet port and the at least one inlet port of the fuel cell stack to form a cooling circuit for the fuel cell stack; and

a pressure regulation means for controllably exhausting waste gases from the cooling circuit.

23. (New) A fuel cell assembly comprising:

a fuel cell stack comprising at least one inlet port for receiving cooling water and at least one outlet port for discharging water and/or water vapor, the inlet port and the outlet port each communicating with at least one membrane electrode assembly of the fuel stack;

a thermal storage tank comprising a heat exchanger conduit therethrough, the heat exchanger conduit having an inlet and an outlet coupled respectively to the at least one outlet port and the at least one inlet port of the fuel cell stack to form a cooling circuit for the fuel cell stack, the thermal storage tank comprising a water jacket surrounding the heat exchanger conduit, the water jacket comprising a cold water feed and a hot water draw off point; and

a valve coupled between the hot water draw off point and a waste water outlet, and a temperature sensor in the cooling circuit for actuating the valve when the water in the cooling circuit exceeds a predetermined temperature.